

## **The effect of wide binaries on planet occurrence - K2 Campaign 6**

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We plan to observe a sample of wide binaries spread across the K2 fields to constrain the effect of wide multiplicity on planet occurrence and to provide benchmark systems for gyrochronology.

Science Goal 1: Probe the effect of wide multiplicity on planet occurrence. Wide companions are common in the field; Raghavan et al (2010) found that >20% of solar-type stars have a companion wider than 100AU. Any link between planet occurrence and wide multiplicity will have a significant effect on the number of habitable planets in the Galaxy. We propose to test the disruption of planetary systems caused by a wide companion proposed by Kaib et al. (2013). In this theory, wide companions interact with field stars and are sent into elliptical orbits bringing them close to their primary star, possibly close enough to disrupt a planetary system. This could eject planets from the system or provide an instigator for migration, moving giant planets closer to their parent star. Over the course of the next two years we will target approximately 1000 stars across the 10 K2 fields yielding approximately 20 planets. This will allow us to measure the occurrence of short period planets around stars in wide binaries and to test whether this deviates significantly from the field population. This will constrain the potential systematic bias on planet occurrence rates caused by multiplicity. Kepler has already been used to accurately measure the rotation periods of thousands of stars.

Science Goal 2: Provide benchmark gyrochronology systems. Wide binary systems contain stars which are physically isolated from each other yet share common metallicity and age. This means that the stars in these systems can be used to test age relations, which should give similar ages for both components. By including wide binary components as Kepler targets, we will produce a valuable legacy product to test and recalibrate gyrochronology relations allowing the ages of field stars to be better constrained.

Target Selection. We will use the proper motion catalogue produced by Kraus et al. (2014) based on the methods of Kraus & Hillenbrand (2007) including proper motions, estimated spectral types and distance moduli from SED fitting. We will select objects with significant ( $>5\sigma$ ) proper motions above 30mas/yr. From these we will select pairs of widely separated objects with common proper motion and distance. To remove contamination due to coincident pairings of unrelated field stars, we will plot a histogram similar to the one we constructed for fields 4 & 5 of pair separations. From this we will select pairs which lie in the region dominated by true physical pairs. We will likely only select candidates in field 6 as our preliminary analysis suggests that field 7's low latitude means that the coincident pairing rate is too high to select any true common proper motion binaries.